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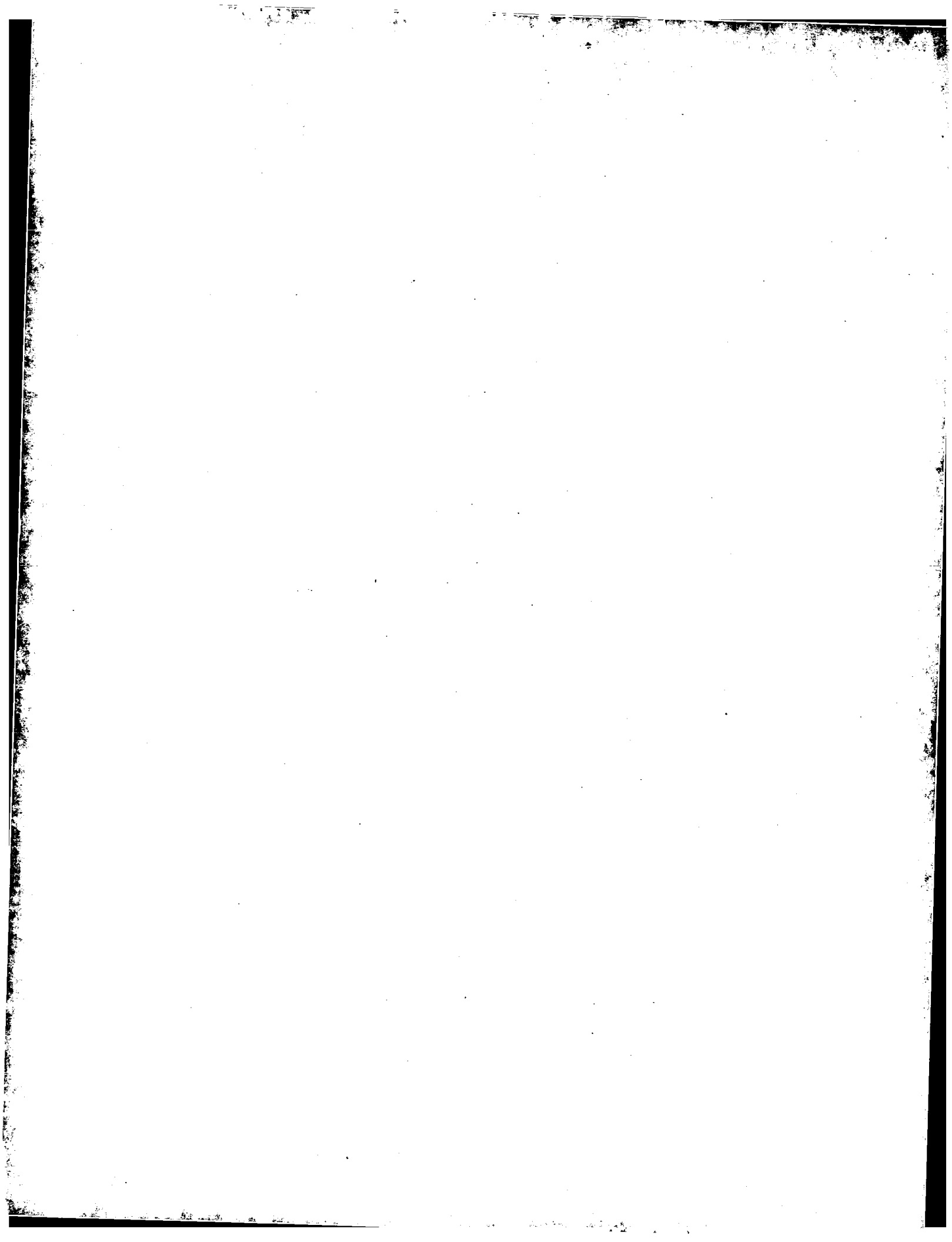
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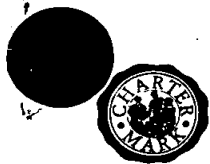
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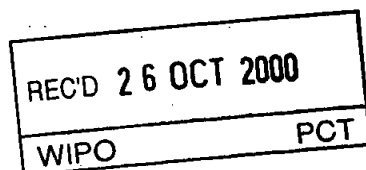


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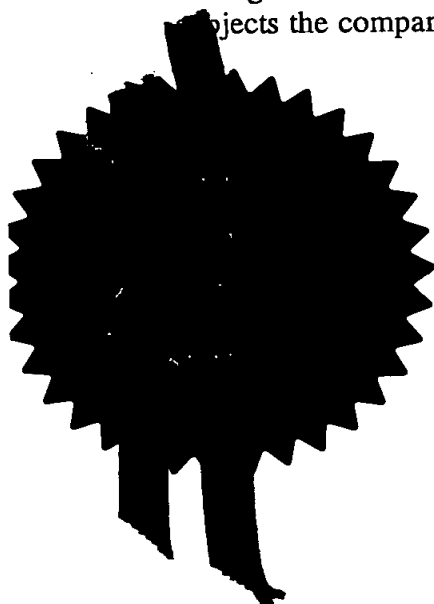
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I, the undersigned, being an officer duly authorised in accordance with Section 74(1) and (4) of the Deregulation & Contracting Out Act 1994, to sign and issue certificates on behalf of the Comptroller-General, hereby certify that annexed hereto is a true copy of the documents as originally filed in connection with the patent application identified therein.

In accordance with the Patents (Companies Re-registration) Rules 1982, if a company named in this certificate and any accompanying documents has re-registered under the Companies Act 1980 with the same name as that with which it was registered immediately before re-registration save for the substitution as, or inclusion as, the last part of the name of the words "public limited company" or their equivalents in Welsh, references to the name of the company in this certificate and any accompanying documents shall be treated as references to the name with which it is so re-registered.

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Signed

Dated 12 October 2000



Patents Act 1977

(Rule 16)

THE PATENT OFFICE
16 SEP 1999
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The
Patent
Office

1/77

Request for grant of a patent

(See the notes on the back of this form. You can also get an explanatory leaflet from the Patent Office to help you fill in this form)

The Patent Office

Cardiff Road
Newport

Gwent NP9 1RH

1. Your reference

NG/ARB

16SEP99 14:77:173-1 0001:00
0017700 0.00 - 7921859.6

2. Patent application number

(The Patent Office will fill in this part)

9921859.6

16 SEP 1999

3. Full name, address and postcode of the or of each applicant (underline all surnames)

SMITH INTERNATIONAL, INC.
16740 Hardy Street,
Houston,
Texas 77205-0068,
U.S.A.

5796727001

Patents ADP number (if you know it)

If the applicant is a corporate body, give the country/state of its incorporation

4. Title of the invention

DOWNHOLE LATCH SYSTEM

5. Name of your agent (if you have one)

"Address for service" in the United Kingdom to which all correspondence should be sent (including the postcode)

A.A. THORNTON & CO.,
Northumberland House,
303-306 High Holborn,
London WC1V 7LE

Patents ADP number (if you know it)

75001

6. If you are declaring priority from one or more earlier patent applications, give the country and the date of filing of the or of each of these earlier applications and (if you know it) the or each application number

Country

Priority application number
(if you know it)

Date of filing
(day / month / year)

7. If this application is divided or otherwise derived from an earlier UK application, give the number and the filing date of the earlier application

Number of earlier application

Date of filing
(day / month / year)

8. Is a statement of inventorship and of right to grant of a patent required in support of this request? (Answer 'Yes' if:

- a) any applicant named in part 3 is not an inventor, or
 - b) there is an inventor who is not named as an applicant, or
 - c) any named applicant is a corporate body.
- See note (d))

Patents Form 1/77

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9. Enter the number of sheets for any of the following items you are filing with this form. Do not count copies of the same document

Continuation sheets of this form

Description 5

Claim(s) ---

Abstract ---

Drawing(s) 4 (plus two figures on one sheet of description)

10. If you are also filing any of the following, state how many against each item.

Priority documents ---

Translations of priority documents ---

Statement of inventorship and right to grant of a patent (Patents Form 7/77) ---

Request for preliminary examination and search (Patents Form 2/77) ---

Request for substantive examination (Patents Form 10/77) ---

Any other documents (please specify) ---

11. I/We request the grant of a patent on the basis of this application.

Signature

Date

A.A. Thornton & Co.

16.09.99

12. Name and daytime telephone number of person to contact in the United Kingdom

NIGEL GOODENOUGH - 01604 638242

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Notes

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Patents Form 1/77

The equipment is required for the second lateral leg in a seven leg multilateral well where leg one has been drilled out of the shoe, and where the latch coupling will form a reference point in the liner. It is proposed that 7" liner is run and suspended off bottom in 8 1/4" hole with the lower end cemented around the shoe. Close to the bottom of the liner a 7" latch coupling is to be installed, if necessary with a biased edge for re-entry purposes. The plan is to use the latch and coupling in conjunction with a hydraulic set retrievable packer to isolate the lower bore from losses. In this application of the system trials of entry and re-entry will be performed.

Once the liner has been run and set with the first leg drilled, it will be necessary to jet the profile in the latch coupling clean. It is proposed the jetting operation will be combined with a survey run which would eliminate the need to run our hydraulic swivel allowing us to independently orient the whip relative to the coupling orientation. (If the latch did not have any orientation profile, we could use the hydraulic swivel). To enable this test, we plan to attempt to latch into the profile before jetting to determine the criticality of the operation, and then to disengage, jet the profile clean, re-engage, survey and come out of hole. In the event that we engage it may not be necessary to jet the profile, however this should be done as a matter of course and due consideration given to whether it is safe to eliminate the jet run. Should more than one latch coupling be installed, surveys can be taken consecutively as the string is pulled out of hole. Note that all the coupling profiles are identical and the same latch assembly can be used for this purpose.

The proposed bottom hole assembly for this phase of the operation would be:

Orienting Latch Assembly
ACC Tool
Drill Pipe Spacer
MCBPV
NMDC
MWD

(or hydrostatic pressure?)

The latch could be hydraulically configured to operate at depth in response to the pressure drop across the ACC tool before survey. The bypass valve would be closed to enable this feature to be activated. A survey would be possible at this time too, noting of course that the latch would have been scribed to the MWD offset. However this system application requires that we need to isolate the well bore, therefore it is desirable that the latch is mechanical, and is tripped on surface before running in hole. There will not be a bottom to activate the system down hole.

Assuming that the wash, latch and survey operation has been completed satisfactorily, the next phase of the operation is to run the latch, whipstock with milling assembly pre-configured to suit the coupling orientation. The milling assembly will have the torque through shear bolt design and horse shoe adapter on the head. The hydraulic retrievable

packer will have a lower connection to allow it to interface with the latch sub. Conflict of setting pressure for the packer and tripping pressure for the latch will be manifested at this point, hydraulically, we need to activate the latch down hole independently of the packer without pre-setting the packer before we are engaged in the latch profile. To eliminate the possibility of a mis-run we should therefore consider that the latch is mechanically activated on surface, and spring biased in the engaged position to allow down hole orientation and engagement. We therefore need to rotate through the latch coupling and reciprocate if we do not have a biased edge to cam the assembly round, alternatively, we have a biased edge, pass through the coupling and pull back to engage.

To this end, we have a proven shear bolt system as described with the horse shoe above. The latch dog system will be able to cope with frictional contact down hole, and the only other area for concern would be to ensure that drilling solids or other debris lying on the low side of the well bore will not compromise the latch activation.

The proposed bottom hole assembly for this phase of the operation would be:

Orienting Latch Assembly
Hydraulic Retrievable Packstock Assembly
Trackmaster Mill
Running Tool
Drill Pipe Flex Joint
MCBPV
NMDC
MWD

Once the window has been milled, and the lateral drilled, the assembly will be retrieved in the normal fashion, utilising the hook, and a re-entry run established using another whipstock or deflector system. The mill / running tool will be used to confirm exit of the window. The system will be recovered to surface and the subsequent operations will continue in the normal method using the retrievable packstock system.

The proposed bottom hole assembly for this phase of the operation would be:

Orienting Latch Assembly
Whipstock or deflector
Trackmaster Mill
Drill Pipe Flex Joint
NMDC
MWD

System requirements may be refined to drop out equipment as and when confidence of the operation is established.

Subject to the success of the system it is understood consideration will be given to utilising more latch couplings in the wells.

Other points of note for implementation of the system:

The wiper plug necessary for the cementing operation has to be a dual wiper, with sufficient space out between the wipers to ensure the wipers straddle the latch profile and that they get pumped across without pressure loss and subsequent fluid bypass. This is especially important with regard to the latch incorporating the biased edge. If no biased edge is utilised, the need for two wipers is eliminated.

The latch coupling is 7 1/4" OD with the equivalent casing weight ID, so for 7" 23# = 6.375" ID.

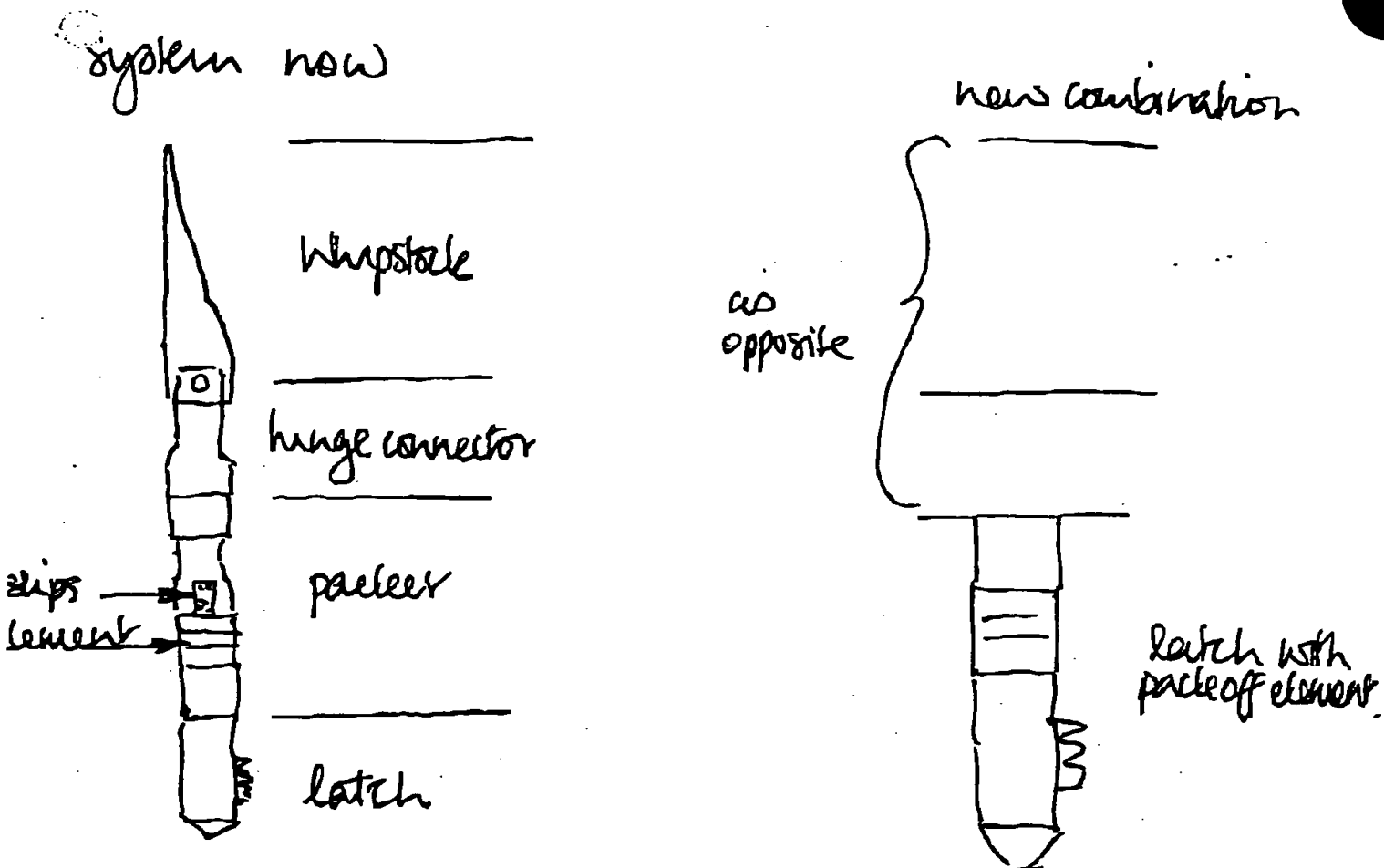
The latch coupling length with biased edge will be about 8ft, and without biased edge, 4ft, note these lengths may vary.

The latch coupling material yield strength will be 80,000psi (L80 equivalent), and connections will be LTC.

Further consideration is necessary with regard to the use of composite casing joints versus steel joints and drilling out using the PDC drill ahead system.

Bruce McGarian
Engineering Manager - Eastern Hemisphere
Smith Services Red Baron Group

15 September 1999.



Both systems are hydraulically activated in principle, however limitations in setting pressures/sequences mean that the latch can not be activated independently of the packer - when the bypass valve closes, the string pressures up, virtually uncontrollably and both tools would set, the packer setting would prevent us from engaging the latch and in actual fact, the latch with element on its own, would suffer similar problems without some significant sequencing device to ensure the packoff stayed

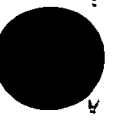
relaxed until we need it activated.

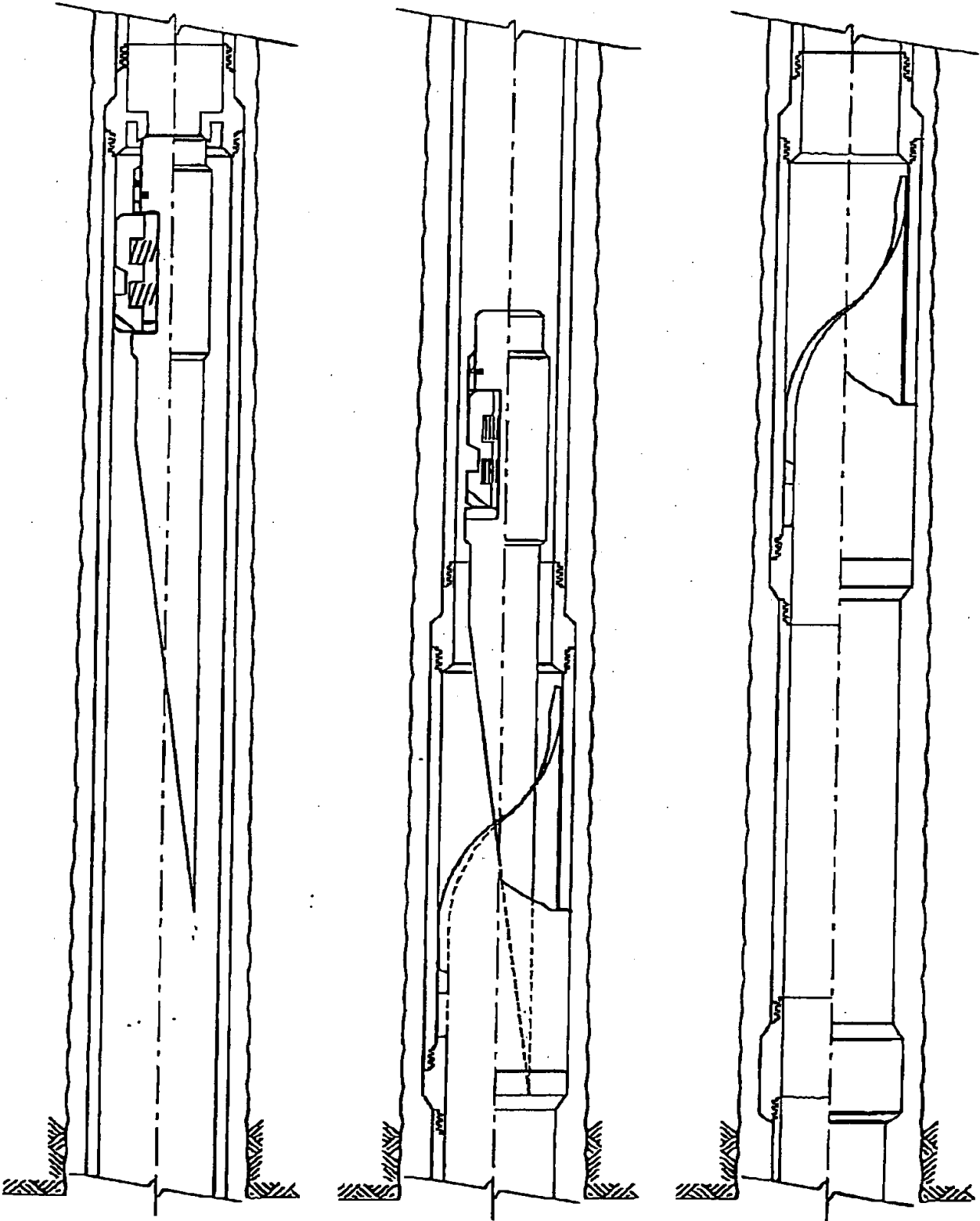
The need for the element to be activated (since we do not actually need the anchor / packer ship element) is to isolate the lower leg from losses.

The sequence of operation would therefore be to orient the system with MWD circulating the string through the BPV. Then close the BPV to pressure the string and activate the latch. Engage the latch in the coupling.

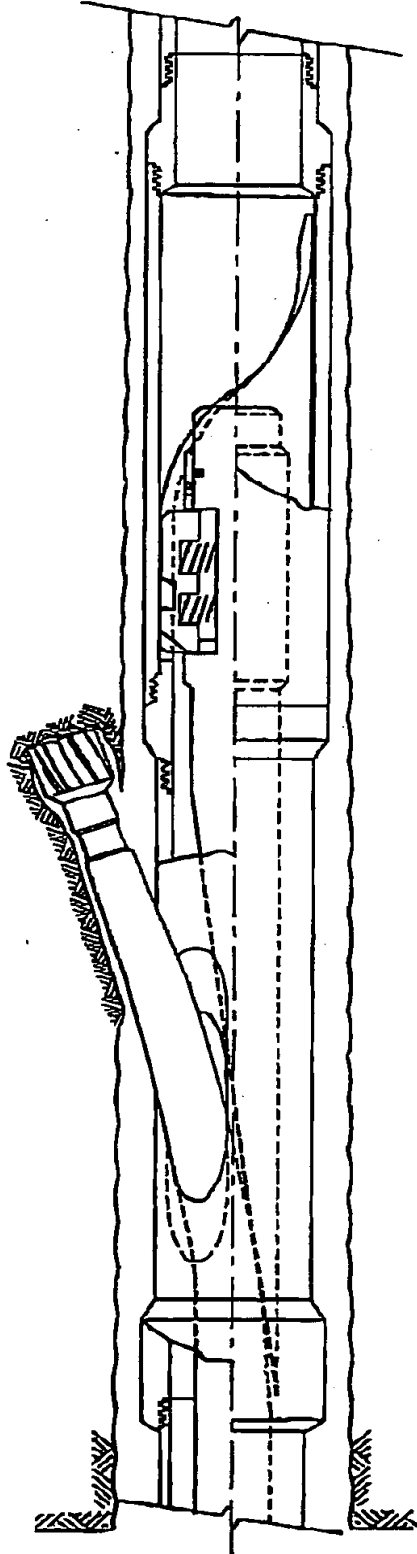
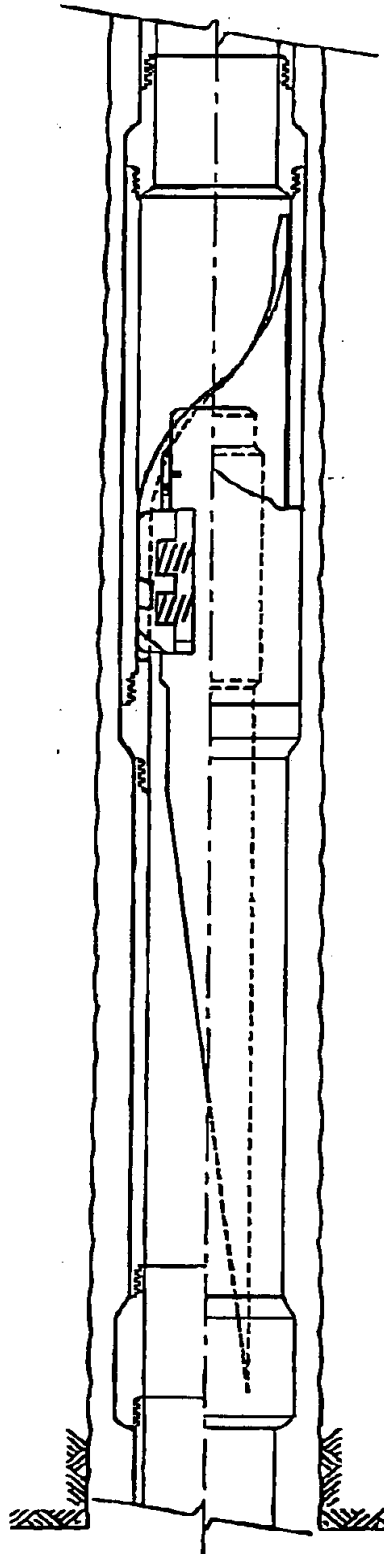
Check orientation if required, this would need the BPV to be cycled open to circulate for MWD survey, close again and set pack off element. Naturally a second survey is not necessary, and once the latch is engaged, the pack off element can be set.





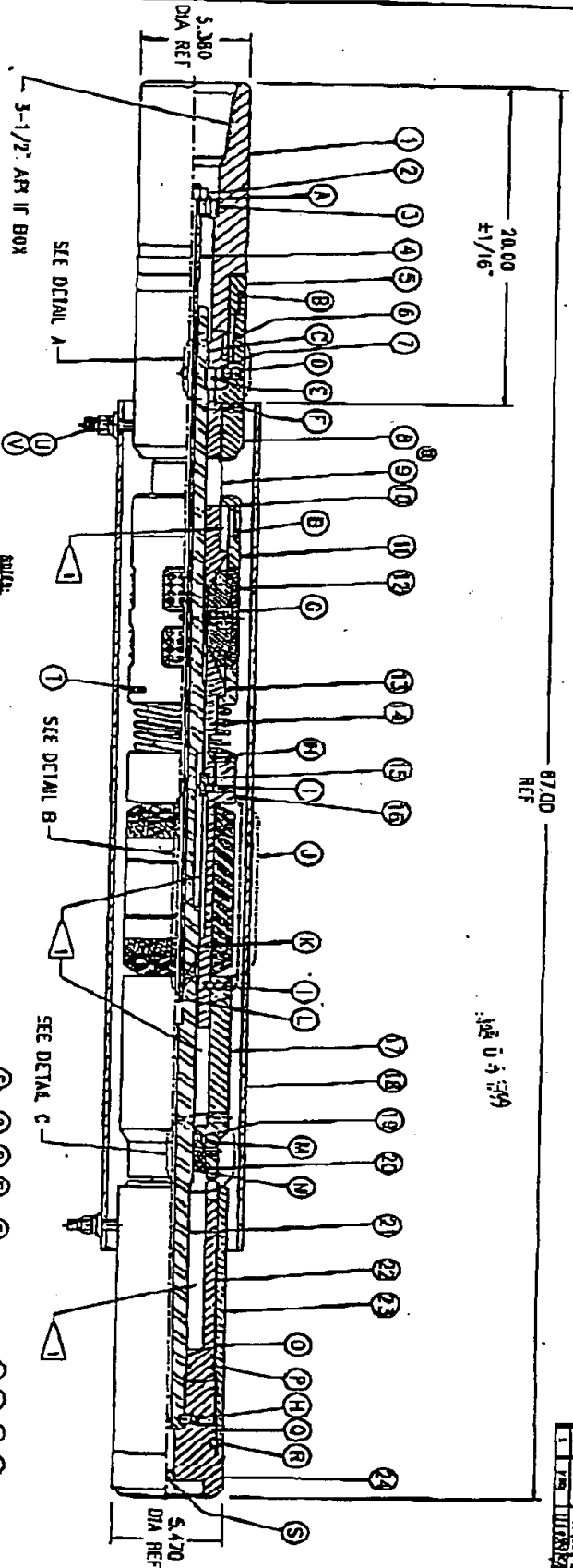








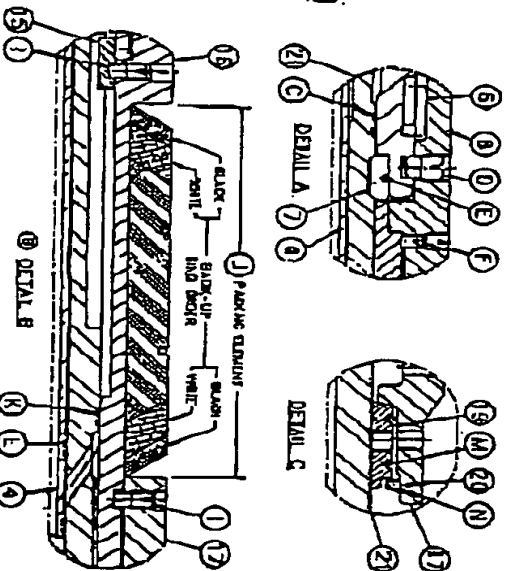
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5	REV	11/03/99	5	



- NOTES:
- 1. SEE DETAIL A FOR ASSEMBLY WITH BUSH-PIN JOINTS.
 - 2. SEE DETAIL B FOR ASSEMBLY WITH BUSH-PIN JOINTS.
 - 3. SEE DETAIL C FOR ASSEMBLY WITH BUSH-PIN JOINTS.
 - 4. SEE DETAIL D FOR ASSEMBLY WITH BUSH-PIN JOINTS.
 - 5. SEE DETAIL E FOR ASSEMBLY WITH BUSH-PIN JOINTS.
 - 6. SEE DETAIL F FOR ASSEMBLY WITH BUSH-PIN JOINTS.
 - 7. SEE DETAIL G FOR ASSEMBLY WITH BUSH-PIN JOINTS.
 - 8. SEE DETAIL H FOR ASSEMBLY WITH BUSH-PIN JOINTS.
 - 9. SEE DETAIL I FOR ASSEMBLY WITH BUSH-PIN JOINTS.
 - 10. SEE DETAIL J FOR ASSEMBLY WITH BUSH-PIN JOINTS.
 - 11. SEE DETAIL K FOR ASSEMBLY WITH BUSH-PIN JOINTS.
 - 12. SEE DETAIL L FOR ASSEMBLY WITH BUSH-PIN JOINTS.
 - 13. SEE DETAIL M FOR ASSEMBLY WITH BUSH-PIN JOINTS.
 - 14. SEE DETAIL N FOR ASSEMBLY WITH BUSH-PIN JOINTS.
 - 15. SEE DETAIL O FOR ASSEMBLY WITH BUSH-PIN JOINTS.
 - 16. SEE DETAIL P FOR ASSEMBLY WITH BUSH-PIN JOINTS.
 - 17. SEE DETAIL Q FOR ASSEMBLY WITH BUSH-PIN JOINTS.
 - 18. SEE DETAIL R FOR ASSEMBLY WITH BUSH-PIN JOINTS.
 - 19. SEE DETAIL S FOR ASSEMBLY WITH BUSH-PIN JOINTS.
 - 20. SEE DETAIL T FOR ASSEMBLY WITH BUSH-PIN JOINTS.
 - 21. SEE DETAIL U FOR ASSEMBLY WITH BUSH-PIN JOINTS.
 - 22. SEE DETAIL V FOR ASSEMBLY WITH BUSH-PIN JOINTS.
 - 23. SEE DETAIL W FOR ASSEMBLY WITH BUSH-PIN JOINTS.
 - 24. SEE DETAIL X FOR ASSEMBLY WITH BUSH-PIN JOINTS.

ITEM	PART NUMBER	DESCRIPTION	QTY	ENG NO
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2	3001231	ROTOR SHAFT	1	D-1231
3	3001232	ROTOR SHAFT KEY	1	D-1232
4	3001233	ROTOR SHAFT KEY	1	D-1233
5	3001234	ROTOR SHAFT KEY	1	D-1234
6	3001235	ROTOR SHAFT KEY	1	D-1235
7	3001236	ROTOR SHAFT KEY	1	D-1236
8	3001237	ROTOR SHAFT KEY	1	D-1237
9	3001238	ROTOR SHAFT KEY	1	D-1238
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ITEM	PART NUMBER	DESCRIPTION	QTY	ENG NO
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J.V.

